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United States Department of Agriculture, FOREST SERVICE.

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SILVICAL LEAFLET 37.

WHITE-BARK PINE.

Pinus albicaulis Engelm.

White-bark pine is of scarcely any commercial value, because of the small size and usually scrubby growth of the tree and the inaccessible situations in which it grows. The wood, however, is much like that of the other white pines, and when accessible is used by miners for props, fuel, and ties. The real value of the species is its ability to grow on the highest, steepest ridges, subject to erosion and torrential run-off, and to act as a soil cover. Its strong, spreading root system, and dwarfed, matted crown at high altitudes adapt it to form part of protection forests or watersheds which supply irrigation projects and city water supplies.

RANGE AND OCCURRENCE.

White-bark pine is a true timber-line species. From British Columbia and Alberta to southern California, it is found on the high peaks of the Coast Range, Cascades, Sierras, and Rockies. It grows as far east as the eastern slope of the Sierras in Nevada, in the Rocky Mountains of Wyoming, around the Yellowstone National Park, and the Helena National Forest in Montana. It is confined within narrow altitudinal limits on alpine slopes and exposed ridges throughout its range. In southern British Columbia and northern Washington, Idaho, and Montana its altitudinal range is from 5,000 to 7,500 feet; in southern Montana and Wyoming, from 6,000 to 9,300 feet on north and west slopes, to 9,800 feet on south exposures, and up to 11,000 feet toward the east; in northern Oregon, from 5,500 to 7,500 feet; in southern Oregon, from 6,000 to 8,000 feet on north, and to 9,500 feet on south exposures; in central California, from 7,000 to 8,000 feet on the north sides and to 9,800 feet on the south sides of ridges; in the San Bernardino Mountains on the highest peaks up to timber line, which lies at a height of 11,000 feet and sometimes slightly higher.

CLIMATE.

This tree endures great seasonal ranges of temperature, from -60° F. to 100° F., and the daily ranges on the high, exposed ridges where

it is found are particularly great. The precipitation, a large proportion of it in the form of snow, may be as small as 15 inches, or much greater. Severe winds and a very short vegetative season are characteristic of its habitat.



ASSOCIATED SPECIES.

In Washington it sometimes forms pure, open stands on exposed grassy areas, but is usually in mixture with other species. It grows in Montana in open situations, preferably on northern slopes, where it forms an open stand with alpine fir, Engelmann spruce, alpine larch, limber pine, and lodgepole pine. It is found on the summits of the Cascades at timber line, commonly in pure stands, but sometimes with alpine fir and black hemlock. Toward the lower limits of its altitudinal range it is associated with yellow cedar, lowland and noble firs, and lodgepole and silver pines. It is occasionally found with Engelmann spruce and lodgepole pine in Montana and Wyoming. In the Sierras it forms small, pure groups at timber line, interspersed with small patches of black hemlock, and silver and lodgepole pines at slightly lower altitudes. In the Monterey National Forest it grows on the north slope of the Pinnacle, both pure and with Jeffrey pine and white fir.

HABIT.

White-bark pine under favorable conditions in dense stands on deep, rich soil attains, at maturity, a height of from 50 to 60 feet and a diameter of 2 feet, with a fairly compact crown and a bole clear for one-third of its length. This, however, represents its best development. More frequently it is from 30 to 35 feet in height and from 12 to 18 inches in diameter, with a loose crown which grows down on the trunk almost to the ground. On high, cold sites it dwindles in size until at absolute timber line it is prone on the ground in the depressions of the rock, with matted branches and a stubby trunk less than a foot in length. The root system in such situations is very well developed and strong, though not deep.

On the bole the typical bark is deeply ridged and varies in color from cinnamon-brown to dirty white, while on the branches it is smooth and of a gray or white color.

SOIL AND MOISTURE.

It grows in almost any kind of soil, among broken, bare rocks, in disintegrated granite, and in shallow soils with little moisture. While probably the least exacting of all conifers as regards soil and soil moisture requirements, yet, like other trees, it grows best on a moist, well-drained ground of good quality.

TOLERANCE.

In youth it is very intolerant, but becomes somewhat less so with advancing age. In the northern part of its range it is light demanding

to a marked degree; in the south, on the Santa Barbara Mountains, where the light is intense and atmospheric moisture is small, its presence on north slopes only, and in less open stands, indicates somewhat greater tolerance. It is more tolerant in good soils and at low altitudes than on poor soils and near timber line.

REPRODUCTION.

The seed-producing capacity of the tree is generally good, but varies considerably with locality. In the north seed years are at long intervals; in the south they are frequent. Large quantities of the seed are destroyed by birds and squirrels, and reproduction is scanty as a result. The seeds are not adapted to wide dissemination by wind, and reproduction is usually confined to the vicinity of seed trees. When not protected by mother trees, seedlings are subject to great damage by winds. Its ability to reproduce on the exposed limits of forest growth, both at timber line and on dry, grassy, open places, indicates that it may be used in the future as an advance growth to extend forested areas.

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